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UTILITY APPLICATION FOR UNITED STATES PATENT  
FOR  
RESILIENT COMPOUND AND SEALING DEVICE CONTRUCTED THEREFROM

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1AP20 Rec'd PCT/PTO 26 JUN 2006TITLE OF THE INVENTION

Resilient compound for sealing device comprising detectable material such as barium sulfate

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BACKGROUND TO THE INVENTION

This invention relates to a resilient compound useful for sealing purposes and sealing devices constructed therefrom.

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A problem, which exists in the food manufacturing/processing industry, arises from the presence of unwanted foreign inclusions in the foodstuff.

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When the foodstuff is of a type where it can be filtered it is generally the case that the foreign inclusion can be filtered out. However, there are foodstuffs, which by their very nature cannot be filtered or readily be filtered. The foodstuff may also be of a type such that during the manufacturing or processing procedure it reaches a state where filtration is no longer a viable means of removing foreign inclusions.

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Such foodstuffs are often found in the dairy industry and include cheese, ice cream and the like.

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Foreign inclusions can come from various potential sources. Many of the sources of inclusions can be controlled so that the possibility of an inclusion originating from the potential source is very low or it can be detected/intercepted before it becomes entrained in the foodstuff.

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One example of a source of inclusions in the dairy and other food processing plants has been identified as seals (more particularly ring type joint ("RTJ") seals). Seals, especially of the RTJ type, are widely used in pipe work fittings in foodstuff manufacturing and processing plants. The inclusion generally arises from a small piece of the seal breaking away or being cut/forced from the seal.

One of the primary reasons for sealed break down is the clean in place ("CIP") wash process, which regularly takes place in such plants. The CIP wash involves a flush, which includes caustic solution followed by a water flush, which are pumped through the plant between process batches in order to clean out the whole plant. The caustic flush is aggressive and over time with repeated CIP wash cycles will start to attack the seals, which results in particles coming off.

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Another example is when the seal is part of a valve such as a gate valve, butterfly valve, flap valve or the like the operation of the valve can cause a small part of the seal to be separated from the main body of the seal.

Also food manufacturing/processing plants are routinely disassembled and reassembled either entirely or in part for maintenance, cleaning or repair purposes. As a consequence seals in unions, valves, joints and the like can become damaged. Thus, small particles of seal material can become separated from the main seal material. These small particles can, for example, find their way into a flow passage, valve or union and ultimately become entrained in product as the product passes therethrough.

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Cheese is a foodstuff where filtration cannot be used or, as the product forms, becomes a non-viable means of removal of foreign inclusions. Thus it becomes extremely difficult to detect whether a foreign inclusion is present in the product. Other products, which suffer from this problem, can be highly viscous or solid (semi-solid) foodstuffs, which by their very nature prevent the use of conventional filtration methods.

### SUMMARY OF THE INVENTION

10 It is thus an object of the present invention to provide a resilient compound useful for sealing purposes and sealing devices made therefrom whereby it is possible to detect if a part of the sealing compound has become entrained in a processed product more particularly a foodstuff.

15 Broadly in one aspect of the present invention there is provided a resilient compound for use in forming a seal characterised in that the sealing compound includes a detectable material dispersed therethrough.

According to a second broad aspect of the invention there is provided a sealing device made in whole or in part from a resilient compound, which includes a detectable material, dispersed therethrough.

In the preferred form of the invention the detectable material is of a type, which can be detected by x-rays, metal detection or other detection means.

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The seal material can be a natural or synthetic rubber or thermoplastic material. During the compounding process the detectable material is uniformly dispersed through the compound.

- 5 In a preferred form of the invention the detectable material is barium sulphate. In a preferred form of the invention the barium sulphate is added at the compounding stage.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

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The present invention is based on the discovery that a small particle of sealing material when made from the compound as defined in the first broad aspect of the invention, which become entrained in a foodstuff during manufacture/processing, can subsequently be detected through the use of x-ray equipment. This is highly desirable for products of a type where filtration is not possible or becomes non-viable as a consequence of the structure of the product or changes of the product during the manufacturing process.

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Thus product prior to the completion of manufacture or at the completion of manufacture can be x-rayed and any seal material entrained in the product can be detected.

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An obvious benefit is that a manufacturer can withdraw from a quantity of product which has been manufactured only that part which may contain a foreign inclusion in the form of seal material.

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Thus, for example, in the dairy industry, and in particular in cheese making, the manufacturer can x-ray each block of cheese and then remove any block in which a foreign inclusion is detected. The manufacturer can therefore avoid the risk that an entire shipment is rejected even though it may only be one component part of the shipment in which a foreign inclusion is found to be present.

To be viable the detectable material must be uniformly dispersed throughout the sealing compound. Thus even very small particle sizes can be detected by x-ray equipment.

The detectable material is therefore added at the compounding stage of the resilient sealing compound. The sealing compound can be principally a natural or synthetic rubber or thermoplastic material. During the compounding stage the detectable material, which will generally be in powder form, is added at the desired percentage by volume.

According to the preferred form of the invention the detectable material is barium sulphate. In the preferred form of the invention the ideal quantity has been found to be about 5% by volume.

According to a preferred form of the invention the basic thermoplastic polyester elastomer polymer material chemically consists of a modified polybutyleneterephthalate of the type which is manufactured and sold by El.DuPont de Nemours & Co. under the registered trade mark HYTREL. This is a composition which complies with the Food & Drug Administration for use in food contact situations i.e. it can be used in articles or components of articles

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for producing, manufacturing, packaging, process, preparing, treating, packaging, transporting or holding food and being intended for repeated food contact. More particularly the particular grade of HYTREL found to be of use for the invention is HYTREL 4068FG.

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Barium sulphate is equally of material, which can be used in seals having food contact. Thus a sealing device manufactured from the sealing compound according to the invention can be used in food manufacturing and processing plants.

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The sealing compound is able to be moulded, extruded or otherwise shaped or formed in order to create a sealing device. The sealing device can take many different forms including static and dynamic "O" rings, sheet gaskets, RJT sanitary O rings, butterfly valve seats, lip seals, other mouldings in sanitary seal applications, sanitary valve seals and the like.

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Sealing material and sealing devices manufactured therefrom in accordance with the present invention can withstand normal clean in place operations. Thus the barium sulphate will not leach out of the sealing material under a caustic wash solution. Furthermore, the barium sulphate will not break down during the normal shelf life of a seal. Nor will it deteriorate either before or during service.

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Thus in a food manufacturing or processing plant which contains sealing devices made according to the present invention, any small particle of the sealing device which may break free or be ripped, cut etc. from the sealing material and become entrained in the foodstuff being processed will be

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detectable by x-ray equipment. Consequently either before or after packaging the foodstuff product can be subjected to x-ray investigation and even very small particles of sealing material will, by virtue of the presence of the barium sulphate therein be detectable. It is then a simple matter of removing any foodstuff product in which a fragment of sealing material has been detected.

The invention is open to modification as will be appreciated by those skilled in the art. For example the detectable material may be a metallic material, which is able to be used in contact with foodstuffs and be evenly dispersed through the sealing material, but does not leach out under say a caustic wash in a clean and place process or break down or deteriorate either before or during service.

The detectable material may be a material, which is detectable by means other than x-ray.

The sealing material according to the present invention while primarily of particular use in the food manufacturing/processing industry can be used in other industries where there is a need to be able to detect a foreign inclusion in a fully or partly manufactured product. Also while it is preferred that the sealing compound be a mouldable compound other compounds are envisaged within the scope of the present invention.

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